

Claims

- [c1] 1.A wire bonding method for pressurewelding a metallic wire to device while applying ultrasonic vibration, said method comprising the steps of applying pressure between the metallic wire and the device and simultaneously applying a vibratory force thereto, detecting the degree of bonding between the metallic wire and the device, and stopping the application of ultrasonic vibration and pressure in response to the detection of completion of the state of bonding.
- [c2] 2.A wire bonding method as set forth in claim 1 wherein the device comprises a semiconductor chip and the metallic wire is welded to a bonding pad on the semiconductor chip.
- [c3] 3.A wire bonding method as set forth in claim 2 wherein the semiconductor chip is mounted on a substrate when the metallic wire is welded.
- [c4] 4.A wire bonding method as set forth in claim 1 wherein the ultrasonic vibration is created by an oscillator.
- [c5] 5.A wire bonding method as set forth in claim 4 wherein the state of bonding is determined by a feedback signal from the oscillator.
- [c6] 6.A wire bonding method as set forth in claim 5 wherein the completion of bonding is determined from an abrupt change of the waveform of the feedback signal.
- [c7] 7.A wire bonding method as set forth in claim 6 wherein the device comprises a semiconductor chip and the metallic wire is welded to a bonding pad on the semiconductor chip.
- [c8] 8.A wire bonding method as set forth in claim 7 wherein the semiconductor chip is mounted on a substrate when the metallic wire is welded.
- [c9] 9.A wire bonding method as set forth in claim 5 wherein the completion of bonding is determined from a lack of significant change in the waveform of the feedback signal.
- [c10] 10.A wire bonding method as set forth in claim 9 wherein the device comprises

a semiconductor chip and the metallic wire is welded to a bonding pad on the semiconductor chip.

- [c11] 11.A wire bonding method as set forth in claim 10 wherein the semiconductor chip is mounted on a substrate when the metallic wire is welded.
- [c12] 12.A wire bonding apparatus having a tool for holding a metallic wire to press it against a device, a vibrator for applying ultrasonic vibration to said tool, an oscillator for powering said vibrator, a control section for controlling output of said oscillator, a pressing device for applying pressing force to said tool, a bonding detector that detects the degree of bonding of the metallic wire to the device to advise said control section when to terminate welding.
- [c13] 13.A wire bonding apparatus as set forth in claim 12 wherein the bonding detector detects the completion of welding by sensing an abrupt change of the waveform of a feedback signal from the oscillatorOLE_LINK1.
- [c14] 14.A wire bonding apparatus as set forth in claim 12 wherein the bonding detector detects the completion of welding by sensing a lack of significant change of the waveform of a feedback signal from the oscillator.

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